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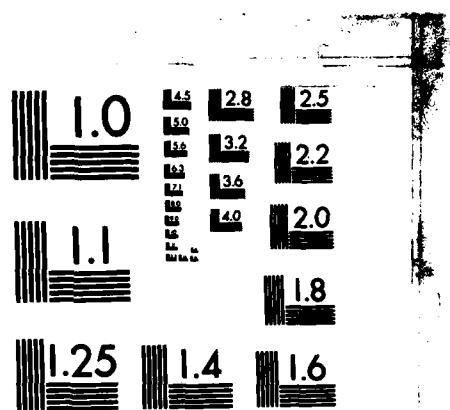
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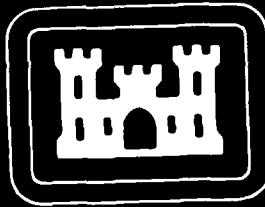
E. James Books
Margaret F. Fox
Alice L. Holmes

May 1985

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Prepared for
U.S. ARMY CORPS OF ENGINEERS
ENGINEER TOPOGRAPHIC LABORATORIES
FORT BELVOIR, VIRGINIA 22060 - 5546



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PREFACE

This is Supplement 13 to the report titled "Bibliography of In-House and Contract Reports" (AD-877 653L), (Supplement 1, AD-890 066L), (Supplement 2, AD-905 548L) (Supplement 3, AD-B005 275L), (Supplement 4, AD-B010 6421), (Supplement 5, AD-B019 966L), (Supplement 6, AD-A055 468), (Supplement 7, AD-A068 744), (Supplement 8, AD-A084 111), (Supplement 9, AD-A099 803), (Supplement 10, AD-A113 006), (Supplement 11, AD-A128 400), (Supplement 12, AD-A141 778). It is a continuing bibliography of reports prepared by and for the U.S. Army Engineer Topographic Laboratories (USAETL), Fort Belvoir, Virginia. This bibliography includes reports that were published from 1 January 1984 through 31 December 1984.

Reports with AD numbers can be purchased by Department of Defense agencies from the Defense Technical Information Center; other agencies and individuals can purchase copies from the National Technical Information Service, Springfield, Virginia 22161. Reports with a "B" in the AD number are limited in distribution to U.S. Government agencies unless permission for release is granted from the controlling office. Reports are available on an interlibrary loan from the Scientific and Technical Information Center (STINFO), U.S. Army Engineer Topographic Laboratories, Fort Belvoir, Virginia 22060-5546.

COL Alan L. Laubscher, CE was Commander and Director, and Mr. Walter E. Boge, was Technical Director of the Engineer Topographic Laboratories during the report preparation.

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ETL-0329

AD-A153 926

**AIR PHOTO ANALYSIS, PHOTO INTERPRETATION LOGIC,
AND FEATURE EXTRACTION**

June 1984

**Rinker, J.N.
Corl, P.A.**

Keywords: Photo Analysis, Photo Interpretation Logic, Feature Extraction, Air Photo Keys, Image Analysis, Remote Sensing, Vegetation Classification, Knowledge Based Systems

This is a status report about some of the research efforts within the Center for Remote Sensing (CRS) that are associated with image analysis. Emphasis has been placed on the manual procedure of photo analysis, photo interpretation logic, classification schemes, and knowledge based systems. Information derived from other sources and information presented by contributors are acknowledged in the appropriate sections.

ETL-0339

AD-B082 993L

DIGITAL PRE-PRESS SYSTEM DESIGN STUDY
December 1983

Lianza, Thomas

EIKONIX Corporation

DACA76-83-C-0006

Keywords: Cartography, Computers, Electronic Pre-press, Graphic Arts, Mapping

This report recommends an approach, hardware/software requirements, and design specifications for a digital pre-press system. This system will process digital cartographic data and create composited, symbolized, and edited data files formatted for input to digital graphic arts reproduction systems.

**METHODOLOGICAL PRELIMINARIES TO THE DEVELOPMENT
OF AN EXPERT SYSTEM FOR
AERIAL PHOTO INTERPRETATION**
January 1984

Hoffman, Robert R.

Keywords: Aerial Photo Interpretation, Artificial Intelligence, Psychology of Perception, Experimental Methods

This report describes an investigation of the psychological aspects that affect the reasoning of expert aerial photo interpreters. The purpose of the study is to help develop an artificial intelligence expert system to aid terrain analysis. Artificial intelligence offers tools for studying and representing expert knowledge and reasoning. This study examines four methods for extracting the expert's knowledge: The Standard Terrain Analysis Method, the Structured Interview Method, the Limited Information Task, and the Method of "Tough Cases." Criteria are presented for analyzing the four methods, and criteria that must pertain to aerial photo interpretation in order for expert systems tools to be applicable are described. This report discusses the structure of expert systems, in general, and the structure of an expert system for photo interpretation , in particular.

SYNTHESIS GUIDE FOR RIVER CROSSINGS
(Report No. 11 in the ETL series on Guides for Army Terrain Analysts)
October 1983

Messmore, Jeffrey A.

Keywords: Military Geographic Information, River Crossing, Tactical Gap Crossing, Terrain Analysis

This report provides a method for evaluating watercourse segments for suitability as river-crossing areas. The primary source of information for this evaluation is the preformatted Watercourses/Water Bodies data field. General guidance is given concerning how additional data fields and terrain analysis products such as Roads and Related Structures, Concealment, and Cross-Country Movement could be used to refine this evaluation further.

ETL-0346

AD-A142 728

**A MATHEMATICAL METHOD FOR INVERSION IN
ATMOSPHERIC REMOTE SENSING**

November 1983

Margerum, Eugene A.

Keywords: Integral Equations, Inversion Methods, Radiative Transfer, Remote Sensing

A method is developed for solving Fredholm integral equations of the first kind. The method is particularly intended for use in obtaining atmospheric profiles from remotely sensed radiance measurements, and should be generally useful for numerical inversion problems where the solution can be expressed as a linear superposition. Some discussion of general mathematical and physical considerations is also given.

ETL-0347

AD-A141 772

**ANALYSIS OF INTERACTIVE IMAGE CLEANSING
VIA RASTER-PROCESSING TECHNIQUES**

November 1983

Friend, Nancy J.

Keywords: Interactive Image Cleansing, Raster Processing, STARAN Associative Array Processor, Binary Imagery

An Analysis of an interactive image-cleansing program, RASTER, is presented. RASTER is utilized for cleansing binary imagery in a fast and effective manner via nine programmed functions, which are herein described and illustrated.

ETL-0348

AD-A140 197

**INTERACTIVE DIGITAL IMAGE PROCESSING FOR
TERRAIN DATA EXTRACTION, PHASE 4**
November 1983

**Heydt, Howard
Karkhanis, Vijay
Wescott, Thomas**

General Electric Company

DAAK70-79-C-0153

Keywords: Digital Image Processing, Terrain Analysis, Feature Classification, Raster to Polygon Conversion, Digital Mosaicking

This phase of the study concentrated on refinement of vegetation extraction techniques developed in phases 1 through 3. Software was also generated for scaling and mosaicking vegetation data derived from separate adjacent scenes, as appropriate for covering a given map area. The raster format classification files were converted to polygon vector files in the Standard Interface Format.

ETL-0349

AD-A142 698

VOICE INTERACTIVE SYSTEMS TECHNOLOGY (VIST) RESEARCH
January 1984

DeYoung, Tice F.

Keywords: Automated Word Recognition, Speech Recognition, Speech Synthesis, Voice Technology, VTAG

This report discusses the results to date of the VIST research at the U.S. Army Engineer Topographic Laboratories (ETL), and describes in detail how to make the Interstate Electronics Corporation Voice-Recognition Module and Voice-Synthesis Module work on Hewlett-Packard 1000, Data General Eclipse S-250, and Digital Equipment Corporation PDP-11/45 minicomputers.

ETL-0350

AD-A141 766

**REGISTRATION OF A LANDSAT IMAGE TO A
DTM—AN ERROR ANALYSIS
January 1984**

Crombie, Michael A.
Shine, James A.
Moore, William
Allton, Glenn

Keywords: Digital Image, DTM, Error Propagation, LANDSAT, Least Squares, Pattern Recognition

A mathematical model is postulated and tested that will enable a user to relate a digital LANDSAT image to a digital terrain matrix (DTM). The practicality of the procedure is examined and evaluated.

ETL-0351

AD-B086 190L

**DIRECT DIGITAL COLOR PROOFING TECHNOLOGY OVERVIEW
January 1984**

Harris, Barry

Dunn Technology, Incorporated

DAAK70-83-C-0162

Keywords: Computers, Color Proofing, Graphic Arts, Electronic Prepress, Electronic Picture Processing

As the use of capital-intensive electronic picture processing equipment, such as color scanners and color electronic prepress systems, becomes more widespread in Defense Mapping Agency (DMA) production activities, the need for an accurate, economical, and fast Direct Digital Color Proofing (DDCP) system must be considered.

Reviewed in this report are the market forces driving the development and commercialization of DDCP in general, the photographic color materials available for use in DDCP, conventional prepress proofing materials/systems that form the technology base for DDCP, potential electrophotographic proofing methods, DDCP systems that provide a hard copy output without the use of intermediates, and obstacles to adapting this emerging technology to meet DMA's requirements.

ETL-0352

AD-A147 637

TERRAIN ANALYSIS PROCEDURAL GUIDE FOR SURFACE CONFIGURATION

(Report No. 12 in the ETL Series on Guides for Army Terrain Analysts)

March 1984

Mintzer, Olin

Messmore, Jeffrey A.

Keywords: Terrain Analysis, Remote Sensing, Topography, Aerial Photography, Military
Military/Geographic Information, Geology/Soils, Factor Mapping, Surface
Roughness, Slope, Landform, Photo Interpretation

This procedural guide is an instructional manual for the use of the U.S. Army Terrain Analyst when preparing the following factor overlays: slope, landform, and surface roughness. These overlays are constructed from the analysis of the combined data extracted from literature, topographic maps, and aerial/LANDSAT imagery. A catalog section includes the descriptions of photo pattern, topographic map, and surface roughness data elements for thirty-seven typical topographic/geologic forms.

ETL-0353

AD-A141 778

BIBLIOGRAPHY OF IN-HOUSE AND CONTRACT REPORTS

SUPPLEMENT 12

March 1984

Barrón, Rosalinda P.

Author and title indexes are provided for the ETL "Bibliographies of In-House and Contract Reports." The indexes are designed to be used in conjunction with the 12 published bibliographies and refer to them by year and page: AD-877 653L(1970); AD-890 066L(1971); AD-905 548L(1972); AD-B005 275L(1975); AD-B010 642L(1976); AD-B019 966L(1977); AD-A055 468(1978); AD-A068 744(1979); AD-A084 111(1980); AD-A099 803(1981); AD-A113 006(1982); AD-A128 400(1983).

The indexes were prepared by the staff of the Scientific and Technical Information Center.

ETL-0354

AD-A142 918

TERRAIN ANALYSIS PROCEDURAL GUIDE FOR BUILT-UP AREAS
(Report No. 13 in the ETL Series on Guides for Army Terrain Analysts)
April 1984

Frodigh, Roland J.

Keywords: Terrain Analysis, Topography, Photo Interpretation, Urban Areas, Military Geographic Information

This procedural guide provides the Army Terrain Analyst with the methods and procedures to generate thematic, or factor overlays, with supportive tables, for portraying approximately 20 built-up area elements. Retrieval of information from these basic sources (topographic maps, photography, and literature) is considered, and applied techniques for development of factor overlays are documented in a step-by-step sequence.

ETL-0355

AD-A148 295

LOW COST GYROCOMPASS
June 1984

Kishel, Joseph F.

GYROART, Incorporated

DAAK70-83-C-0168

Keywords: Azimuth, Gyrocompass, Gyroscope, North-finding

This report summarizes study and analysis efforts that were directed towards using gyro-technology to define true north to an accuracy of 2 milliradians in 2 minutes time in the presence of vibration environments encountered on launch vehicles. It concludes that a device could be fabricated to meet stated requirements by using a design approach that avoids the dynamics problems inherent in all pendulous suspensions for the gyro.

ETL-0356

AD-B088 848L

AUTOMATIC CONTROL OF DIGITAL STEREO CORRELATION METHODS

June 1984

Pfirman, Eric S.

Barrett, Scott A.

Barth, Stephen W.

Kinn, Gerald J.

PAR Technology Corporation

DACA76-83-C-0003

Keywords: Digital Stereo Correlation, Feature Extraction, Image Classification, Pixel Matching, Rule-Based Heuristics, Symbolic Image Processing

This report describes the approach used and results obtained in the process of combining two independent methods for automatic stereo correlation into one operational program. One method is the Symbolic Matching for Automatic Stereo Correlation (SMASC) program, which uses symbolic image processing techniques to match stereo images of predominantly urban areas. The second is the Digital Image Matching Program(DIMP), which uses conventional pixel matching to determine correlation between images and is more appropriate in rural areas. By combining the two methods, a single approach is obtained which is generally more applicable to a wider range of stereo images than either of its independent parts.

ETL-0357

AD-A142 388

**DATA INTEGRITY FACTORS AFFECTING THE CONSTRUCTION OF THE
MAPPING, CHARTING, AND GEODESY DATA BASE**

July 1983

Friedman, S.Z.

Jet Propulsion Laboratory

Numerous data integrity problems were encountered while processing the digitized map data used for the research task, "An Image Based Approach to Mapping, Charting, and Geodesy" (JPL Task No. RD-182, Amendment 125). Increased interest in those problems has prompted this separate report. Specific data integrity problems are analyzed and methods for their solution are described. Although many of the problems described herein are project specific, this document contains information which could be useful to data base specialists who are concerned with data integrity problems associated with building large cartographic data bases.

ETL-0358

AD-B083 114L

VERTICAL OBSTRUCTION STUDY, FINAL REPORT
April 1984

Dam, A.L.

Helava Associates, Incorporated

DAAK70-82-C-0028

Keywords: Computers, Digital Image Processing, Photogrammetry

This report documents some basic studies in extracting possible candidates for vertical obstructions from digitized aerial imagery using various digital processing techniques.

ETL-0359

AD-A143 250

**MANUAL AND AUTOMATED LINE GENERALIZATION AND
FEATURE DISPLACEMENT**
June 1984

Zoraster, Steven
Davis, Dale
Hugus, Marc

ZYCOR, Incorporated

DAAK70-82-C-0149

Keywords: Automated Cartography, Line Generalization, Feature Displacement, Line Smoothing, Map Compilation, Map Generalization

The primary objective of this effort was to examine map compilation techniques used for manual and automated line generalization and feature displacement. Manual techniques used at several Defense Mapping Agency compilation sites are described in detail. An extensive survey of algorithms suggested in the cartographic, image processing, and computer science literature is provided. Possible criteria for evaluating algorithm performance are discussed and line generalization algorithms are ranked according to certain of these measures.

ETL-0360

AD-A150 176

HEXAGONAL DATA BASE STUDY, PHASE II
October 1984

Gibson, Laurie
Gomer, William
Lucas, Dean

Interactive Systems Corporation

DAAK70-82-C-0133

Keywords: Hexagonal Data Structures, Automated Mapping, Polygon Processing

This is a final report for a study in the application of hexagonal data structures to handling geographic information. This report presents the results of an experimental software implementation utilizing hexagonal data structures as applied to test data base.

ETL-0361

AD-B087 012L

SATELLITE OBSERVATIONS OF WIDESPREAD FOG
June 1984

Wexler, Ruth L.

Keywords: Fog, Degraded Visibility, Satellite Observation, Dissipation, Temperature Changes, Pressure Changes, Weather Impact

This case study of widespread fog, as revealed by satellite observations, is part of an Army-wide investigation of problems causing battlefield obscuration. The purpose of the study is to develop a spatial and temporal model of fog dissipation by the use of satellite imagery. It is expected that such a model will be of aid to field commanders in their analyses of operational constraints of men and materiel. Satellite photographs of fog on 6 October 1982 as well as associated surface weather observations, are used to present a weather scenario of extensive fog over the Eastern United States. From a sequence of satellite images, one could determine the rate of the inward shrinking of the fog area with time, based on measurements of the fog periphery. The fog initially covered an area of $8.6 \times 10^4 \text{ km}^2$ in the early morning and shrank to an area of $5 \times 10^3 \text{ km}^2$ by mid-afternoon. From aloft, the behavior of the fog tended to reveal, rather than conceal, certain terrain features, such as mountains, valleys, coastlines, and rivers. The temporal and spatial changes of temperature, pressure, and visibility near the center of the fog were compared with those near the edges or outside the fog. The variation of such parameters within fog should be of interest to users of electro-optical sensors. This study illustrates that satellite observations can provide valuable military intelligence on visibility conditions not readily attainable by other means.

ETL-0362

AD-A153 531

DESIGN ISSUES IN VIDEO DISC MAP DISPLAY
October 1984

Olson, Judy M.

Keywords: Map Design, Optical Disc, Screen Resolution, Video Disc Mapping, Video Disc Technology

Design of maps for video disc display presents new challenges for the cartographer. Design issues cover the map itself, the disc, and the hardware and software system. Topographic map design for video disc should contain all the desired earth area within a 3.75x5cm map size. This assures that the graphic area will be resolved on a standard television monitor at normal reading distances. Maps with less detail may be filmed in larger sizes. Potential design features to consider include sheet overlap that would eliminate seams in images and legends that fit to monitor width. Existing maps could be modified to preserve readability of small symbolism. The disc itself could be examined for possible areas of improvement for holding map images. Areas for experimentation include user abilities to deal with the equivalent of small map portions; the overlap problem; and the problem of designing maps that portray the same area at different scales, and allow the user to recognize that they are all of the same area.

ETL-0363

AD-A153 322

STUDY OF RASTER METAFILE FORMATS
November 1984

Taylor, Marshall R.
French, Peter N.

Resources Planning Associates, Incorporated

DAAG29-81-D-0100

Keywords: Computer Graphics, Data Transfer Standards, Metafiles, Graphic Kernel System (GKS), Virtual Device Metafile (VDM), Raster Reformatting System (RRS)

This report examines raster compatible, metafile systems in view of the needs of the Defense Mapping Agency Hydrographic-Topographic Center, and the U.S. Army Engineer Topographic Laboratories. Background material is presented regarding the role of a graphic metafile standard in ETL/DMAHTC's cartographic applications. The issues relevant to the design of a raster compatible metafile system are examined. A recommendation is made to ETL/DMAHTC for adoption of the American National Standards Institute - Virtual Device Metafile proposed national standard.

**DIURNAL FREEZE-THAW FREQUENCIES IN SELECTED REGIONS
OF THE HIGH LATITUDES**
July 1984

Wexler, Ruth L.

Keywords: Daily Maximum Temperatures, Daily Minimum Temperatures, Diurnal Freeze-Thaw, Diurnal Temperatures Range, Freeze-Thaw Cycles, Frost Days, Ice Days

The purpose of this study is to provide information on the incidence of daily freezing conditions, i.e., frost days ($\min \leq 0^{\circ}\text{C}$), ice days ($\max \leq 0^{\circ}\text{C}$), and freeze-thaw days ($\min \leq 0^{\circ}\text{C} \max > 0^{\circ}\text{C}$), per month or year throughout Alaska, Eastern Siberia, Iceland, and Greenland. Tables are provided of the above parameters. In addition, linear regression equations were developed for each area for deriving the above information from ordinary climatic data. Station models of percent days per month with freeze-thaw throughout the year are also given for a range of climates in the regions indicated as well as for several German stations representing a range of elevation. Another set of models shows that the percent freeze-thaw per month could be expressed as a function of mean monthly temperature. The constants for the latter (sine) function reflect the continentality of the station. The various models presented demonstrate the relationship between daily freezing conditions and the temperature regime. The results should improve understanding of periglacial activity and provide a means of predicting possible climatic effects on the construction of buildings, roads, and airport runways.

INTELLIGENT ADVISORS FOR CROSS-COUNTRY ROUTE PLANNING
May 1984

Smart Systems Technology, Incorporated

DAAK70-83-P-3175

Keywords: Artificial Intelligence, Computer Science, Expert Systems, Military Planning

Several methods for computing good cross-country routes between map positions from information contained in map data bases and other intelligence sources are evaluated. The problem of determining cross-country mobility from features gathered from map data bases is addressed, with the goal of finding the optimal path between two positions on a map.

ETL-0366

AD-A144 059

IMAGE-BASED APPROACH TO MAPPING, CHARTING, AND GEODESY
February 1982

Friedman, S.Z.

Jet Propulsion Laboratory

Keywords: Digital Processing, Geographic Analysis, Geographic Information Systems, Remote Sensing

Use of the Jet Propulsion Laboratory Image-Based Information System (IBIS) is explored for mapping, charting, and geodesy. Methods and capabilities are detailed, and recommendations are made on ways to expand the system. A comparison is made of the approaches used in geographic information systems by the Jet Propulsion Laboratory and the Analytical Sciences Corporation.

ETL-0367

AD-B086 606L

RWPF SPATIAL DATA STUDY
August 1984

Hirsch, Stephen A.
Quinn, Thomas A.
Marino, Lori Beth

Brooks, Chris A.
Mandico, Nancy A.

PAR Technology Corporation

DACA76-83-C-0002

Keywords: Geographic Information Systems, INGRES, Relational Data Base Management, Spatial Data Structure, Spatial Knowledge Base, Symbolic Data Files

This document is the final report for the "RWPF Spatial Data Study" contract. This study evaluates critical requirements of an MC&G Spatial Knowledge Base (SKB) in supporting standard Geographic Information System capabilities and efficiently representing spatial information. The current spatial data structure residing in RWPF's Symbolic Data Files is evaluated. The potential role of a relational data base management system in support of SKB is examined. DMA's Standard Linear Format data is analyzed to determine how it might reside in a relational component of a Spatial Knowledge Base.

ETL-0368

AD-B086 824L

DESIGN STUDY OF A LARGE FORMAT PRINTER (LFP)
September 1984

Nothmann, Gerhard A.

Xerox Special Information Systems

DAAK70-80-C-0112

Keywords: Map Printer, Map Copier, Xerographic Color Printer, Xerographic Color Copier, Color Digital Output Printer, Proofing Printer, Laser Color Printer, Large Format Xerographic Printer

The results of a study program conducted for the U.S. Army Engineer Topographic Laboratories (USAETL), show that on theoretical grounds the feasibility of a 44 by 60 inch large format multicolor xerographic map printer is not limited by any technological barriers. When printing either from hardcopy originals or from digital files, such a printer would provide the powerful advantages of fast turnaround, input information diversity, and revision flexibility exhibited by computer-compatible imaging systems. Several feasibility issues identified in this study can be resolved only by experimental verification in a subsequent project. The study is based on the current 24 by 30 inch Quick Response Multicolor Printer (QRMP) program as a point of departure. Mechanical, optical, xerographic, and electronic subsystems and digital interface requirements are discussed in detail. Comparative product cost and operating cost data are included.

ETL-0369

AD-B086 854L

**DEVELOPMENT OF DESCRIPTOR SETS FOR THE UNAMBIGUOUS
CHARACTERIZATION OF GEOGRAPHIC FEATURES ON SAR IMAGERY**
August 1984

Pascucci, Richard F.
Huffman, Edward T.

Autometric, Incorporated

Keywords: Feature Descriptors, Radar Exploitation

One approach toward the automated extraction of terrain features from SAR imagery is the development of sets of descriptors that uniquely and unambiguously characterize each feature. This investigation involved a detailed examination 167 SAR image examples covering 17 types of manmade terrain features and the extraction of the descriptors by means of which image analysts identify those features. Thirty-nine such descriptors were identified that, in sets of from three to nine, were found to be necessary and sufficient for the unique characterization of each terrain feature and for its unambiguous identification. It was found that although 287 sets of descriptors were required for the identification of the 17 types of features, all descriptor sets were unique and all of the sets characterizing any individual feature could be formulated in a single Boolean expression.

ETL-0372

AD-B087 383L

**DIGITAL MAP COLOR PROOFING METHODOLOGIES EVALUATION
FINAL REPORT
September 1984**

Dunn, S. Thomas

Dunn Technology, Incorporated

DAAK70-83-C-0162

Keywords: Computers, Color Proofing, Graphic Arts, Electronic Prepress, Electronic Picture Processing

As the use of capital-intensive electronic picture processing equipment such as color scanners and color electronic prepress systems becomes more widespread in Defense Mapping Agency (DMA) production activities, the need for an accurate, economical, and fast Direct Digital Color Proofing (DDCP) system must be considered.

This report summarizes the results of an indepth analysis of DDCP methodologies and technologies applicable to direct digital color proofing of digital cartographic data files. It identifies and reports on candidate systems/technologies and recommends a course of action for successful development of a digital map color proofer in the 1985-1990 timeframe.

ETL-0373

AD-B087 292L

**DIGITAL MAP COLOR PROOFING METHODOLOGIES EVALUATION
FINAL REPORT (PROPRIETARY)
September 1984**

Dunn, S. Thomas

Dunn Technology, Incorporated

DAAK70-83-C-0162

This annex to ETL-0372 contains proprietary information only.

ETL-0374

AD-A148 580

**INTERACTIVE DIGITAL IMAGE PROCESSING FOR TERRAIN
DATA EXTRACTION, PHASE 5**
September 1984

Heydt, Howard
Karkhanis, Vijay
Peterson, Chris

General Electric Company

DAAK70-79-C-0153

Keywords: Terrain Analysis, Digital Image Processing, Interactive Analysis, Digital Image Data Base, Digital Image Mosaic, Image Rectification, Thematic Classification, Terrain Roughness, Aerial Imagery, Satellite Imagery

Some techniques were investigated for extracting terrain surface roughness data from digital aerial imagery. Measurement of tonal changes in the imagery is one feasible approach. A digital image data base was assembled containing 10 image planes, 4096 x 4096 pixels/plane, 8 bits/pixel. The planes contain Landsat Thematic Mapper image data, four digitized aerial photos which were rectified, registered to the Thematic Mapper image and mosaicked, and digitized aerial radar imagery, all for the same scene. From the digital photomosaic, open water and forested areas were extracted using a gray level-texture classification.

ETL-0375

AD-B088 755L

**AUTONOMOUS GROUND VEHICLES: CONTROL SYSTEM
TECHNOLOGY DEVELOPMENT**
October 1984

Ruoff, C. Hanson, J. Brooks, T.
Bowyer, J. Holmes, K. Wilcox, B.

Jet Propulsion Laboratory

Keywords: Ground Transportation Equipment, Cybernetics, Navigation and Guidance, Lunar and Planetary Exploration (Advanced)

A phased research and development plan for autonomous (robotic) vehicle perception/control systems, developed by the Jet Propulsion Laboratory, is presented. Vehicle capabilities and mission descriptions are projected in a reconnaissance context for the near (2 to 5 years), mid (5 to 10 years), and far (10 to 20 years) terms. A hierarchical perception/control system architecture based upon these projections is described in detail along with broad control system functional needs. Supporting material includes operational needs, a projection of microelectronic and systems technology, and an extensive control system description including a brief assessment of control requirements. The research plan identifies tasks, estimates resource requirements, and gives a broad time phasing of research activities.

**APPLICATION OF HIERARCHICAL DATA STRUCTURES TO GEOGRAPHICAL
INFORMATION SYSTEMS (PHASE III)**

November 1984

**Samet, Hanan
Rosenfeld, Azriel**

Computer Vision Laboratory

DAAK70-81-C-0059

Keywords: Geographical Information System, Data Structure, Quadtrees, Region-Base
Quadtrees, Point Quadtrees, Attribute Attachment

This document is report of Phase III of an investigation of the application of hierarchical data structure to geographical information systems. It deals primarily with enhancements and improvements to the information system package, an evaluation of design decisions and the collection of empirical results to indicate the utility of the software and justify the design decisions. Tasks reported on include: Attribute attachment, DMA SLF compatibility, memory management improvements and data base enhancements.

FEATURE EXTRACTION ASSESSMENT STUDY , FINAL REPORT
November 1984

Carlotto, M.J.
Tom, V.T.
Wallace, G.K.

The Analytic Sciences Corporation

DACA76-82-C-0004

Keywords: Cartographic Feature Extraction, Image Processing, Pattern Recognition, Image Analysis, Remote Sensing

The purpose of the feature extraction assessment study (FEAS) is to assess the degree to which the DMA feature extraction process can be automated by 1985. The major conclusion of the study is that given the state-of-the-art in image understanding and pattern recognition, a fully automated system for extracting DMA features cannot be built by 1985 using either conventional black and white or multi-spectral/multi-source imagery. Based on an assessment of feature extraction processes operating solely on black and white imagery, a concept of operation for a semi-automated system is formulated, however, which involves the use of machine vision techniques to support the image analyst in a synergistic fashion. An assessment of multi-spectral and multi-source (MS/MS) imagery is also performed to determine if its use would benefit the feature extraction process. A concept of operation for a system to extract DMA features in MS/MS imagery is then developed. It is shown that a key step in the process, the determination of surface material type, can be automated to a large degree given current technology. Moreover, it appears possible to employ 2-d image understanding techniques to infer the presence of certain kinds of DMA features once a surface material map has been derived. Preliminary results indicate the approach to be promising and in need of further examination.

ETL-0378

AD-B089 385L

**ANALYSIS AND TESTS OF ENVIRONMENTAL EFFECTS
ON GYROCOMPASSING ACCURACY**
October 1984

Craig, R.J.

Kim, Dong

Incosym, Incorporated

DAAK70-83-C-0169

Keywords: Earth Rate, North, Gyrocompass, Azimuth, Axis, Angular Rate, Heading, Align, Inclination, Rotate, Milliradian, Time Constant, Bias, Gyro, Accelerometer

Analysis was performed to determine a mechanization for a Northfinding system using a single two-axis, dynamically tuned gyro to determine earth rate and a single two-axis accelerometer, used as an inclinometer, to determine level. A breadboard system was built, software was written, and tests were performed to establish the feasibility and practicality of the approach. Tests were performed in both the laboratory and a test vehicle. Data showed that the breadboard system could find North to an accuracy of approximately one milliradian under typical operational conditions, and the gyrocompass time was reduced from 4 minutes to 2.7 minutes by changing the software during the test period.

ETL-0379

AD-A150 190

DIGITAL LASER PLATEMAKER MODIFICATIONS
December 1984

Technology Applications, Incorporated

DAAK70-83-C-0165

A series of investigations were conducted on the Army's digital laser platemaker to identify and correct deficiencies and increase system overall operability. A new footbar was designed and installed which reduced media loading errors. Accuracy testing indicates that inter-image error is less than 0.002", while intra-image error is not within tolerance. Testing results are encouraging that intra-image errors can be further reduced but additional work is needed in the areas of accuracy testing and alignment of some of the optical components. While the existing machine is functional, there are several areas where components should be redesigned for a production model.

PAPERS

Baussus von Luetzow, Hans. "The Effect of Inertial Systems on the Surveying Profession Under Consideration of the Global Positioning System, Gravity Gradiometry, and Applications." *FIG Engineering Survey Conference*, Washington, D.C., 10-12 March 1984.

Caldwell, Douglas R. "Automating Generalization and Displacement: Lessons Learned from Manual Methods." *American Congress on Surveying and Mapping - American Society of Photogrammetry (ACSM-ASP) Annual Convention*, Washington, D.C., 11-16 March 1984. AD-A140 216.

Carroll, Roberta and Edwards, Daniel L. "DTM Synthesis from Three-Dimensional Cartographic Data." *American Congress on Surveying and Mapping - American Society of Photogrammetry (ACSM-ASP) Annual Convention*, Washington, D.C., 11-16 March 1984. AD-A140 211.

Costanzo, Daniel J. "Requirements and Specifications for Cartographic Video Discs." *1984 Army Science Conference*, West Point, N.Y., 19-21 June 1984. AD-A144 906.

Costanzo, Daniel J. "An Experimental Video Disc for Map and Image Display." *American Congress on Surveying and Mapping - American Society of Photogrammetry (ACSM-ASP) Annual Convention*, Washington, D.C., 11-16 March 1984. AD-A140 215.

Eastes, John W. "Effects of Weathering and Lichen Cover on the Middle Infrared Spectra of Rocks." *American Congress on Surveying and Mapping - American Society of Photogrammetry (ACSM-ASP) Annual Convention*, Washington, D.C., 11-16 March 1984. AD-A140 228.

Eastes, John W.(ETL) and Low, M.J.D.(New York University). "Middle Infrared Spectral Studies of Geologic Materials in their Natural State Using Photothermal Beam Deflection Spectroscopy." *International Symposium on Remote Sensing of the Environment, 3rd Thematic Conference, Remote Sensing for Exploration Geology*, Colorado Springs, Colorado, 15-19 April 1984. AD-A144 894.

Edwards, Daniel L. See Carroll, Roberta.

Leighty, Robert D. "Terrain Navigation Concepts for Autonomous Vehicles." *1984 Army Science Conference*, West Point, N.Y., 19-21 June 1984. AD-A144 994.

Low, M.J.D. See Eastes, John W.

Lukes, George E.(ETL) and McKeown, David, Jr.(Carnegie-Mellon University). "Digital Mapping and Image Understanding." *15th Congress of the International Society for Photogrammetry and Remote Sensing (ISPRS)*, Rio de Janeiro, Brazil, 17-29 June 1984.

PAPERS (continued)

McKeown, David, Jr. See Lukes, George E.

Mattson, Kathleen M. "Video Discs—What Are They and Where Do They Fit In?" 1984 *DOD Mapping, Charting and Geodesy Conference*, Cameron Station, Alexandria, Virginia, 22-25 October 1984. AD-A154 166.

Porter, Elizabeth D. "The Terrain Analyst Work Station." *Technical Exchange and Coordination Workshop on Environmental Support for C²I/Tactical Decision Aids*, San Diego, California, 12-14 June 1984.

Porter, Elizabeth D. "The Terrain Environmental Analysis System." *Technical Exchange and Coordination Workshop on Environmental Support for C²I/Tactical Decision Aids*, San Diego, California, 12-14 June 1984.

Rand, Robert. "Cartographic Feature Extraction on ETL's DIAL System." *American Congress on Surveying and Mapping - American Society of Photogrammetry (ACSM-ASP) Annual Convention*, Washington, D.C., 11-16 March 1984. AD-A140 230.

Satterwhite, Melvin B. "Discriminating Vegetation and Soils Using Landsat MSS and Thematic Mapper Bands and Band Ratios." *American Congress on Surveying and Mapping - American Society of Photogrammetry (ACSM-ASP) Annual Convention*, Washington, D.C., 11-16 March 1984. AD-A140 198.

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| Military Significance of the USAETL Research Note "A New Solution for the Anomalous Gravity Potential Resulting from a Modification of Molodensky's Linear Approximation, Its Practical Significance, and Numerous Ramifications" | 1970 | 7 |
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| Near-Surface Bathymetry System, Report No. 11 in the ETL Series on Remote Sensing | 1979 | 56 |
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| New Analyses and Methods Leading to Improved Target Acquisition Requirements involving Systems, Geodetic and Reentry Errors, and Increased Weapons Effectiveness for Conventional Weapons (Part II) | 1971 | 1 |
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| RC-135A/USQ-28 Category II Test (The Photo- graphic Resolution Capabilities of the KS-78A Camera Subsystem) | 1971 | 13 |
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| Report on Atmospheric Obstructions to Visibility: Volume I - Study Results | 1980 | 11 |
| Report on Atmospheric Obstructions to Visibility: Volume II - Results of Literature Search | 1980 | 13 |
| Research and Design of a PROM Coherent Optical Processor | 1981 | 8 |
| Research and Development Acceptance Test Report Surveying Instrument: Azimuth, Gyro, Lightweight (Lear Siegler Inc. Models) | 1970 | 24 |
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| Selected Bibliography of Corps of Engineers Remote Sensing Reports | 1978 | 64 |
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| Side-Looking Radar Presentation Viewing and Measuring Instrument (Boller and Chivens, Inc.) | 1970 | 55 |
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| Spectral Reflectivity Data: A Practical Acquisition Procedure | 1971 | 17 |
| Spectral/Spatial Resolution Targets for Aerial Imagery (Report No. 1 in the ETL Series on Remote Sensing) | 1975 | 67 |
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| Study to Optimize Performance of the Rapid Geodetic Survey System - Interim Technical Report | 1982 | 9 |
| Study to Optimize Performance of the Rapid Geodetic Survey System Second Interim Report, A | 1983 | 3 |
| Study to Optimize Performance of the Rapid Geodetic Survey System Addendum Report, A | 1984 | 12 |
| Supplement to Preliminary Report on a Multispectral Experiment | 1970 | 52 |
| Surface Climate of the Arctic Basin | 1972 | 2 |
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| Surface Materials and Terrain Features of Yuma Proving Ground, Part I Summary Description | 1976 | 70 |
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| Surveying Instrument: Azimuth, Gyro, Lightweight (SIAGL) (Lear Siegler, Inc.) | 1972 | 3 |
| Synthesis Guide for Cross-Country Movement (Report No. 4 in the ETL series on Guides for Army Terrain Analysts) | 1981 | 9 |
| Synthesis Guide for Lines of Communication (Report No. 7 in the ETL Series on Guides for Army Terrain Analysts) | 1982 | 16 |
| Synthesis Guide for Obstacle Siting (Report No.9 in the ETL Series on Guides for Army Terrain Analysts) | 1983 | 8 |
| System Analysis of the Entire Topographic Support System (TSS), Final Report | 1979 | 50 |
| System Analysis of the Entire Topographic Support System (TSS), Interim Report | 1979 | 47 |
| System and Design Study for an Advanced Drum Plotter | 1971 | 15 |
| System for Automatic Secure Transmission and Reception of Topographic Information - Maps, Photographs, or Alphanumeric Facsimile - at TV Rates | 1972 | 2 |
| System for Topographic Inquiry - No. 1, Micrographic Subsystem | 1975 | 11 |
| System for Topographic Inquiry - No. 2, Alphanumeric Subsystem | 1976 | 48 |
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| Technical Report for Automatic Line Follower | 1975 | 96 |
| Television Display of Topographic Information | 1971 | 15 |
| Television Display of Topographic Information, Phase II | 1972 | 10 |
| Terrain Analysis Procedural Guide for Climate (Report No. 5 in the ETL Series on Guides for Army Terrain Analysts) | 1981 | 20 |
| Terrain Analysis Procedural Guide for Drainage and Water Resources (Report No. 8 in the ETL Series on Guides for Army Terrain Analysts) | 1983 | 9 |
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| Terrain Analyst Synthesizer Station | 1981 | 15 |
| Terrain Data of Mount Hayes D-4 Quadrangle, Fort Greely, Alaska (Report No. 4 in the ETL Series on Remote Sensing) | 1975 | 73 |
| Terrain Effects Analysis Routine for an MGI System | 1976 | 58 |
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| Total Optical Color System (Report No. 2 in the ETL Series on Remote Sensing) | 1975 | 12 |
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| TPLOT: A Simple Program for Plotting Percent Composition Data on Ternary Diagrams | 1975 | 27 |
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| Unified Approach to Mapping, Charting, and Geodesy (MC&G) Data Base Structure Design | 1979 | 25 |
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| Using Terrain Analysis to Predict Likely Minefield Sites | 1984 | 14 |
| Utility of Radar Imagery in the Production of Tactical Terrain Data. Military Capabilities Report | 1977 | 34 |
| Utilization of a Photogrammetric Facility (PF) in Human Engineering Laboratories Battalion Artillery Test Number Two (HELBAT II) | 1972 | 5 |

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| Vegetation Data Extraction Software Documentation/User's Manual | 1984 | 22 |
| Video Stream Processors: A Cost-Effective Computational Architecture for Image Processing | 1981 | 14 |
| Visual Factors Affecting the Precision of Coordinate Image in a Photographic Background | 1970 | 71 |
| Weather Extremes Around the World (Revision of NLABS Report TR-70-45-ES) | 1975 | 70 |
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